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Water Monitoring Management

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SANITARY SURVEY

ATLANTIC OCEAN

MANTOLOKING TO OCEAN GROVE

1995 - 1999

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New Jersey Department of Environmental Protection
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COMMISSIONER

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EXECUTIVE SUMMARY

The results of water quality analysis of samples collected between January 1995 and April 1999 indicate that the *Approved* waters in the shellfish growing area extending from Mantoloking to Ocean Grove met all criteria for classification as *Approved*. There are two (2) wastewater treatment facilities present in this area. However, no impacts to the *Approved* waters of this area from the discharges of these facilities were indicated by the water quality analysis or the on-site inspections of the treatment facilities. As a result of upgrades at the facilities, 3629 acres of *Prohibited* Atlantic Ocean waters, located between Long Branch and Ocean Grove, will be upgraded to *Approved* waters, of which 1815 acres are present in this shellfish growing area. An additional 1814 acres are located in the adjacent growing area (Ocean Grove to Monmouth Beach). In addition, 139 acres of *Approved* waters will be downgraded to *Prohibited* waters due to the recent construction of a new storm water outfall in Point Pleasant Beach.

INTRODUCTION

PURPOSE

This report is part of a series of studies having a dual purpose. The first and primary purpose is to comply with the guidelines of the National Shellfish Sanitation Program (NSSP) that are established by the Interstate Shellfish Sanitation Conference (ISSC). Reports generated under this program form the basis for classifying shellfish waters for the purpose of harvesting shellfish for human consumption. As such, they provide a critical link in protecting human health.

The second purpose is to provide input to the State Water Quality Inventory Report, which is prepared pursuant to Section 305(b) of the Federal Clean Water Act (P.L. 95-217). The information contained in the growing area reports is used for the New Jersey State Water Quality Inventory Report (305b) which provides an assessment to Congress every two years of current water quality conditions in the State's major rivers, lakes, estuaries, and ocean waters. The reports provide valuable information for the 305(b) report, which describes the waters that are attaining state designated water uses and national clean water goals; the pollution problems identified in surface waters; and the actual or potential sources of pollution. Similarly, the reports utilize relevant information contained in the 305(b) report, since the latter assessments are based on instream monitoring data (temperature, oxygen, pH, total and fecal coliform bacteria, nutrients, solids, ammonia and metals), land-use profiles, drainage basin characteristics and other pollution source information.

From the perspective of the Shellfish Classification Program, the reciprocal use of water quality information from reports represent two sides of the same coin: the growing area report focuses on the estuary itself, while the 305(b) report describes the watershed that drains to that estuary.

The Department participates in a cooperative National Environmental Performance Partnership System (NEPPS) with the USEPA which emphasizes ongoing evaluation of issues associated with environmental regulation, including assessing impacts on waterbodies and measuring improvements in various indicators of environmental health. The shellfish growing area reports are intended to provide a brief assessment of the growing area, with particular emphasis on those factors that affect the quantity and quality of the shellfish resource. As the Department implements a comprehensive watershed management program in conjunction with the NEPPS initiative, the shellfish growing area reports provide valuable information on the overall quality of the saline waters in the most downstream sections of each major watershed. In addition, the reports assess the quality of the biological resource and provide a reliable indicator of potential areas of concern and/or areas where additional information is needed to accurately assess watershed dynamics.

HISTORY

As a brief history, the NSSP developed from public health principles and program controls formulated at the original conference on shellfish sanitation called by the Surgeon General of the United States Public Health Service in 1925. This conference was called after oysters were implicated in causing over 1500 cases of typhoid fever and 150 deaths in 1924. The tripartite cooperative program (federal, state and shellfish industry) has updated the program procedures and guidelines through workshops held periodically until 1977. Because of concern by many states that the NSSP guidelines were not being enforced uniformly, a delegation of state shellfish officials from 22 states met in 1982 in Annapolis, Maryland, and formed the ISSC. The first annual meeting was held in 1983 and continues to meet annually at various locations throughout the United States.

The NSSP *Guide for the Control of Molluscan Shellfish* sets forth the principles and requirements for the sanitary control of shellfish produced and shipped in interstate commerce in the United States. It provides the basis used by the Federal Food and Drug Administration (FDA) in evaluating state shellfish sanitation programs. The five major points on which the state is evaluated by the FDA include:

1. The classification of all actual and potential shellfish growing areas as to their suitability for shellfish harvesting.
2. The control of the harvesting of shellfish from areas that are classified as restricted, prohibited or otherwise closed.

3. The regulation and supervision of shellfish resource recovery programs.
4. The ability to restrict the harvest of shellfish from areas in a public health emergency, and
5. Prevent the sale, shipment or possession of shellfish that cannot be identified as being produced in accordance with the NSSP and have the ability to condemn, seize or embargo such shellfish.

FUNCTIONAL AUTHORITY

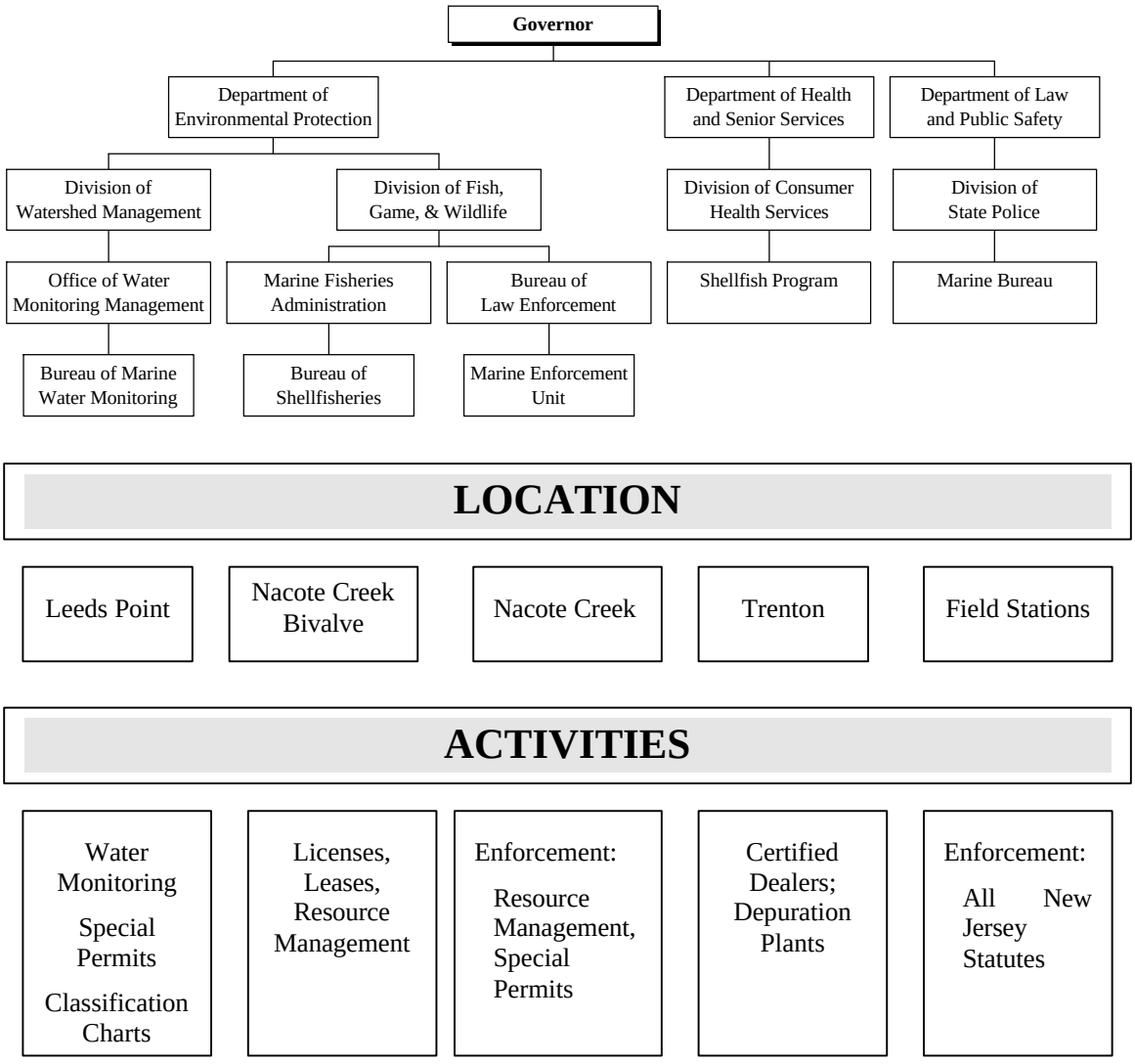
The authority to carry out these functions is divided between the Department of Environmental Protection (DEP), the Department of Health and Senior Services and the Department of Law and Public Safety. The Bureau of Marine Water Monitoring (BMWM) under the authority of N.J.S.A. 58:24 classifies the shellfish growing waters and administers the special resource recovery programs. Regulations delineating the growing areas are promulgated at N.J.A.C. 7:12 and are revised annually. Special Permit rules are also found at N.J.A.C. 7:12 and are revised as necessary.

The Bureau of Shellfisheries in the Division of Fish, Game and Wildlife issues harvesting licenses and leases for shellfish grounds under the Authority of N.J.S.A. 50:2 and N.J.A.C. 7:25. This bureau in conjunction with the BMWM administers the Hard Clam Relay Program.

The Bureau of Law Enforcement in the DEP (Division of Fish, Game, and Wildlife) and the Division of State Police in the Department of Law and Public Safety enforce the provisions of the statutes and rules mentioned above.

The Department of Health and Senior Services is responsible for the certification of wholesale shellfish establishments and in conjunction with the BMWM, administers the depuration program.

FIGURE 1: STATE OF NEW JERSEY SHELLFISH AGENCIES



IMPORTANCE OF SANITARY CONTROL OF SHELLFISH

Emphasis is placed on the sanitary control of shellfish because of the direct relationship between pollution of shellfish growing areas and the transmission of diseases to humans. Shellfish borne infectious diseases are generally transmitted via a fecal-oral route. The pathway is complex and quite circuitous. The cycle usually begins with fecal contamination of the shellfish growing waters. Sources of such contamination are many and varied. Contamination reaches the waterways via runoff and direct discharges.

Clams, oysters and mussels pump large quantities of water through their bodies during the normal feeding process. During this process the shellfish also concentrate microorganisms, which may include pathogenic microbes, and toxic heavy metals/chemicals. It is imperative that a system is in place to reduce the human health risk of consuming shellfish from areas of contamination.

Accurate classifications of shellfish growing areas are completed through a comprehensive sanitary survey. The principal components of the sanitary survey report include:

1. An evaluation of all actual and potential sources of pollution,
2. An evaluation of the hydrography of the area and
3. An assessment of water quality. Complete intensive sanitary surveys are conducted every 12 years with interim narrative evaluations completed on a three year basis. If major changes to the shoreline or bacterial quality occur, then the intensive report is initiated prior to its l2 year schedule.

The following narrative constitutes this Bureau's assessment of the above mentioned components and determines the current classification of the shellfish growing waters.

DESCRIPTION

LOCATION

The ocean shellfish growing waters in this report include approximately 10 miles of coastline from Mantoloking on the south to Ocean Grove on the north, and offshore to the state's three mile jurisdictional limit. (Be advised that all references to "miles" in this report are in nautical measure, whereby, one nautical mile equals 6,076 feet.) This area can be found on Chart # 3 of the New Jersey Shellfish Growing Area Classification Charts. The last Sanitary Survey for this

area covered the time period 1981 through 1987. The last Reappraisal covered the period 1992 through 1995.

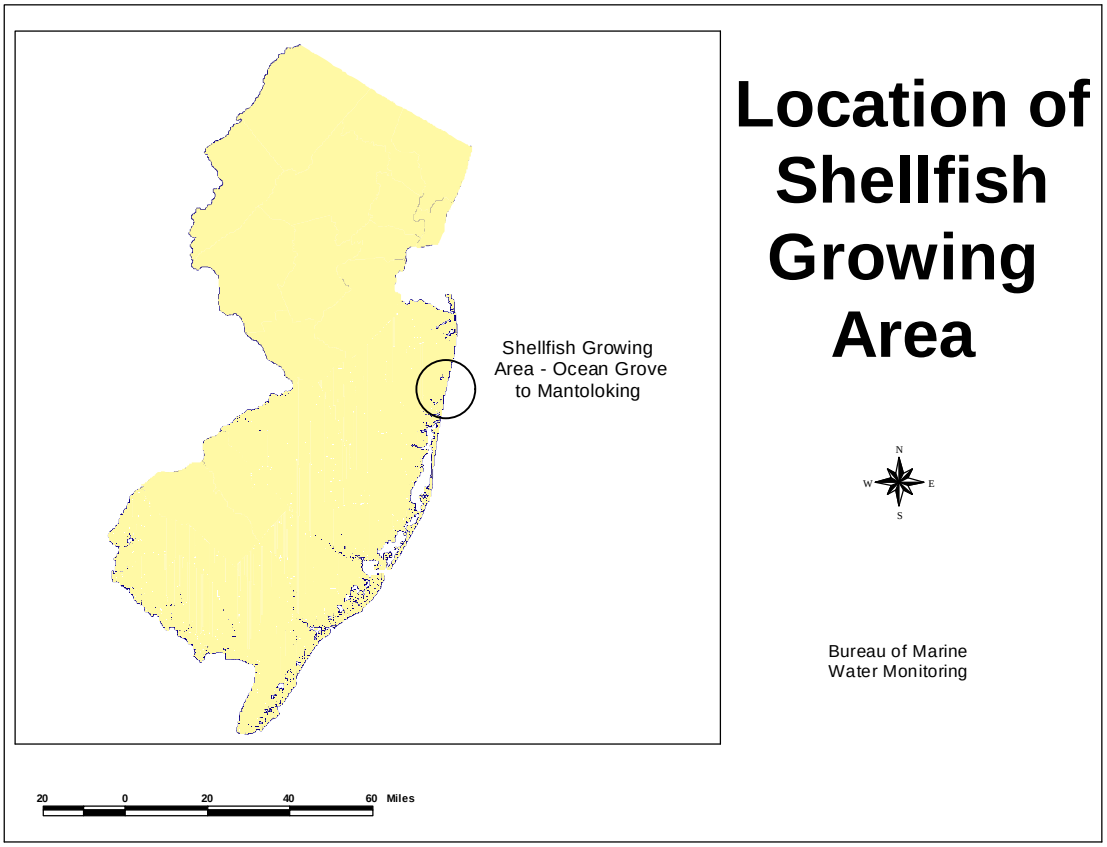


FIGURE 2: LOCATION OF SHELLFISH GROWING AREA

DESCRIPTION

The *Approved* waters of this area are available for the harvest of surf clams (*Spisula solidissima*) and blue mussels (*Mytilus edulis*). The Neptune Township Sewerage Authority (NTSA) and the South Monmouth Regional Sewerage Authority (SMRSA) discharges are located within this area (see map in section concerning pollutant sources). The effluent from the two (2) treatment facilities does not impact the *Approved* waters bordering the closed safety zone surrounding the outfalls of the wastewater treatment facilities.

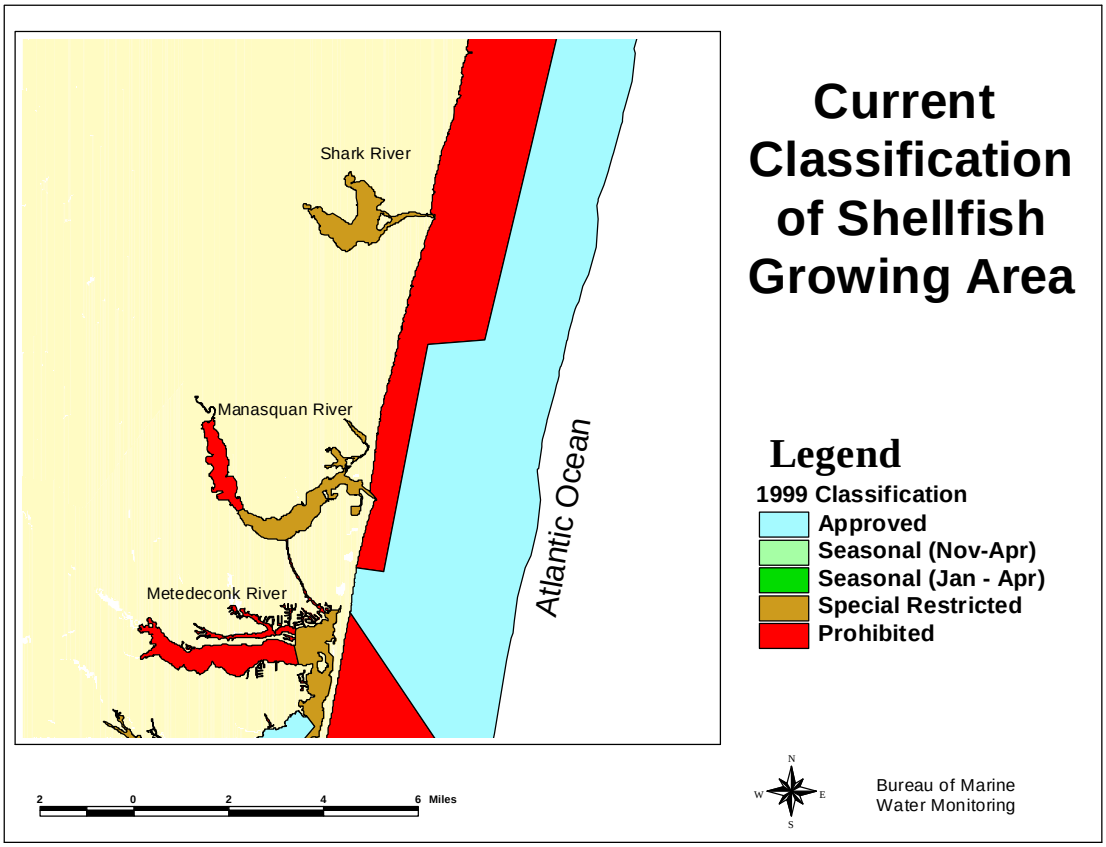


FIGURE 3: CURRENT CLASSIFICATION OF SHELLFISH GROWING AREA

HISTORY

South Monmouth Regional Sewerage Authority (SMRSA) and Neptune Township Sewerage Authority (NTSA) wastewater treatment facility discharges have historically not significantly impacted the region's effluent receiving waters with elevated total coliform levels (a pollution indicating organism). Efforts towards maintenance and improvement of these facilities by the officials overseeing them continue to decrease the likelihood of impact. However, a closed safety zone is still required to surround the outfalls from the facilities. Site visits and evaluation of the historic and current information reveals that should either of the wastewater treatment facilities malfunction, this Bureau would have more than sufficient time to cease shellfish harvesting in the vicinity before any inadequately treated effluent reached the *Approved* waters surrounding the closed safety zone.

A reappraisal covering the time period 1988 through 1991 resulted in a 140 acre reduction in size of the *Prohibited* area surrounding Manasquan Inlet. The last reappraisal for this area was performed for the period covering 1992 through 1995.

METHODS

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 1992).

Approximately 480 water samples were collected in Shellfish Growing Area AO9 for total and fecal coliform bacteria between 1995 and 1999 and analyzed by the three tube MPN method according to APHA (1970). Figure 28 shows the Shellfish Growing Water Quality Monitoring Stations in this area. Approximately 18 stations were monitored during each year. Surface water samples were analyzed for all stations. In addition, ocean bottom samples were analyzed for six (6) stations which were close to wastewater treatment facility discharges.

Water quality sampling, shoreline and watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish,* 1997.

Data management and analysis was accomplished using database applications developed for the Bureau. Mapping of pollution data was performed with the Geographic Information System (GIS:ARCVIEW).

BACTERIOLOGICAL INVESTIGATION AND DATA ANALYSIS

The water quality of each growing area must be evaluated before an area can be classified as *Approved, Seasonally Approved, Special Restricted,* or *Seasonal Special Restricted*. Criteria for bacterial acceptability of shellfish growing waters are provided in NSSP *Guide for the Control of Molluscan Shellfish,* 1997. Each shellfish producing state is directed to adopt either the total coliform criterion, or the fecal coliform criterion. While New Jersey bases its growing water classifications on the total coliform criterion, it does make corresponding fecal coliform determinations for each sampling station, these data are viewed as adjunct information and are not directly used for classification. The State Shellfish Control Authority also has the option of choosing one of the two water monitoring sampling strategies for each growing area.

The Adverse Pollution Condition Strategy requires that a minimum of five samples be collected each year under conditions that have historically resulted in elevated coliforms in the particular growing area. The results must be evaluated by adding the individual station sample results to the preexisting bacteriological sampling results to constitute a data set of at least 15 samples for each station. The adverse pollution conditions usually are related to tide, and rainfall, but could be from a point source of pollution or variation could occur during a specific time of the year. Under this strategy, for *Approved* waters, the total coliform median or geometric mean MPN of the water shall not exceed 70 per 100 mL and not more than 10 percent of

the samples exceed an MPN of 330 per 100 mL for the 3-tube decimal dilution test. For *Special Restricted* waters, the total coliform median or geometric mean MPN of the water shall not exceed 700 per 100 mL and not more than 10 percent of the samples exceed an MPN of 3300 per 100 mL for the 3-tube decimal dilution test. Areas to be Approved under the *Seasonal Special Restricted* classification must be sampled and meet the criterion during the time of the year that it is approved for the harvest of shellfish.

The Systematic Random Sampling strategy requires that a random sampling plan be in place before field sampling begins and can only be used in areas that are not affected by point sources of contamination. A minimum of six samples per station are to be collected each year and added to database to obtain a sample size of 30 for statistical analysis.

The bacteriological quality of every sampling station in *Approved* areas shall have a total coliform median or geometric mean MPN not exceeding 70 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 330 per 100 mL. For *Special Restricted* areas, the bacteriological quality shall not exceed a total coliform median or geometric mean MPN of 700 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 3,300 per 100 mL.

This shellfish growing area is sampled under the Adverse Pollution Condition Strategy described above. The Adverse Pollution Condition Strategy is utilized in shellfish growing area because of the presence of two (2) direct discharges, wastewater treatment facility outfalls from Neptune Township Sewerage Authority and South Monmouth Regional Sewerage Authority.

MARINE BIOTOXINS

The Department collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. This data is evaluated weekly by the Bureau of Marine Water Monitoring in accordance with the NSSP requirements. An annual report is compiled. This is discussed further on page 40.

SHORELINE SURVEY

EVALUATION OF BIOLOGICAL RESOURCES

The primary biological resource of commercial importance for ocean waters in New Jersey is the surf clam. In 1997, surf clams yielded 45,603,401 pounds of meat in New Jersey for an exvessel value of $27,168,453. The New Jersey Surf Clam Advisory Committee, comprised of industry and government

representatives, in conjunction with the Commissioner for the New Jersey Department of Environmental Protection set the quotas for harvest. The quota had been set at 600,000 industry bushels for several years preceding and remained the same for 1997. In addition to being the State's largest molluscan fishery, New Jersey historically leads all other surf claming states in total landings. (Celestino, 1999).

There are occasional occurrences of algal blooms in all ocean waters in New Jersey. Algal blooms tend to occur in ocean waters in the late summer months during periods of hot weather. The primary adverse effect of the algal blooms on water quality is on the aesthetic quality. No occurrences of algal blooms connected with the presence of biotoxins have been recorded for the time period covered by this report. The Department collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. This data is evaluated weekly by the Bureau of Marine Water Monitoring in accordance with the NSSP requirements.

LAND USE

The predominant land use present in close proximity to this growing area is urban. Some agricultural and forested areas of land development are present further away from the growing area. Most non-urban development in the area begins more than a mile away from the shoreline. Therefore, non-urban development is not significant for determining impact on this shellfish growing area. Urban development present in the area has primarily reached saturation with little or no new development likely in the areas in close proximity to the shellfish growing area. Some continued growth may occur in some of the more rural areas which are further away from the shoreline, but due to the distance from this shellfish growing area it is unlikely that these potential changes will adversely impact the shellfish waters.

There are numerous communities bordering this area further inland which have minimal impact on the waters of this area. Sewage from these communities is carried to wastewater treatment facilities by sanitary sewers. Storm water runoff is channeled by storm drains which empty to various other water bodies, mostly fresh water bodies in the vicinity. The majority of these water bodies have no interaction with waters from this shellfish growing area. Those water bodies which do have interaction with this shellfish growing area do not cause significant impact to *Approved* waters due to the presence of closed safety zones of *Prohibited* waters.

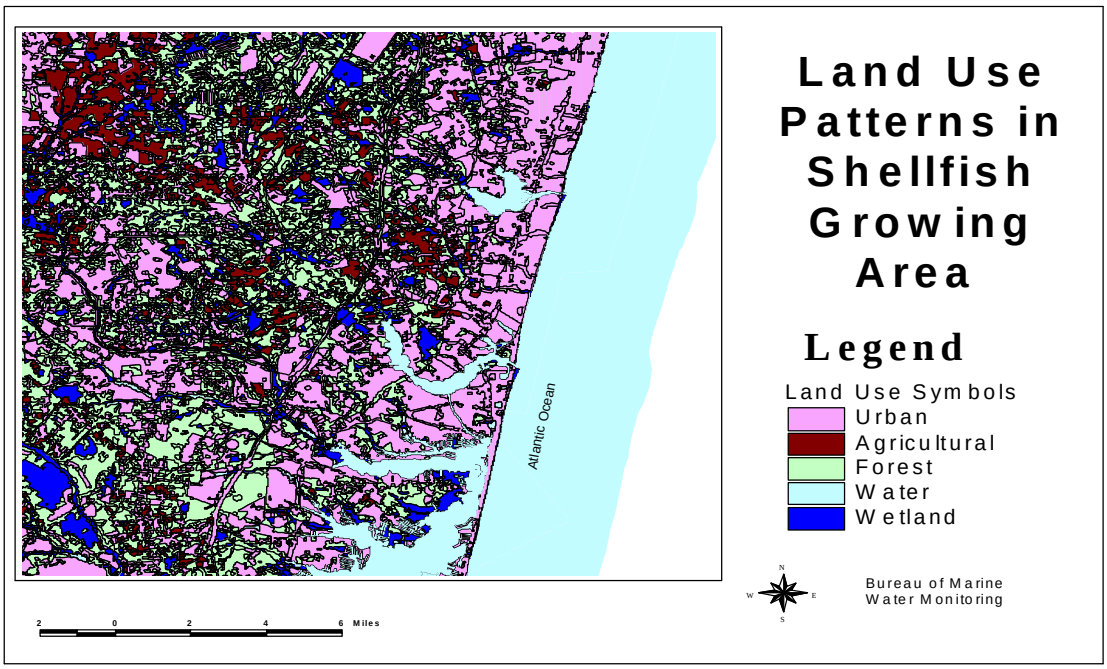


FIGURE 4: LAND USE PATTERNS FOR SHELLFISH GROWING AREA

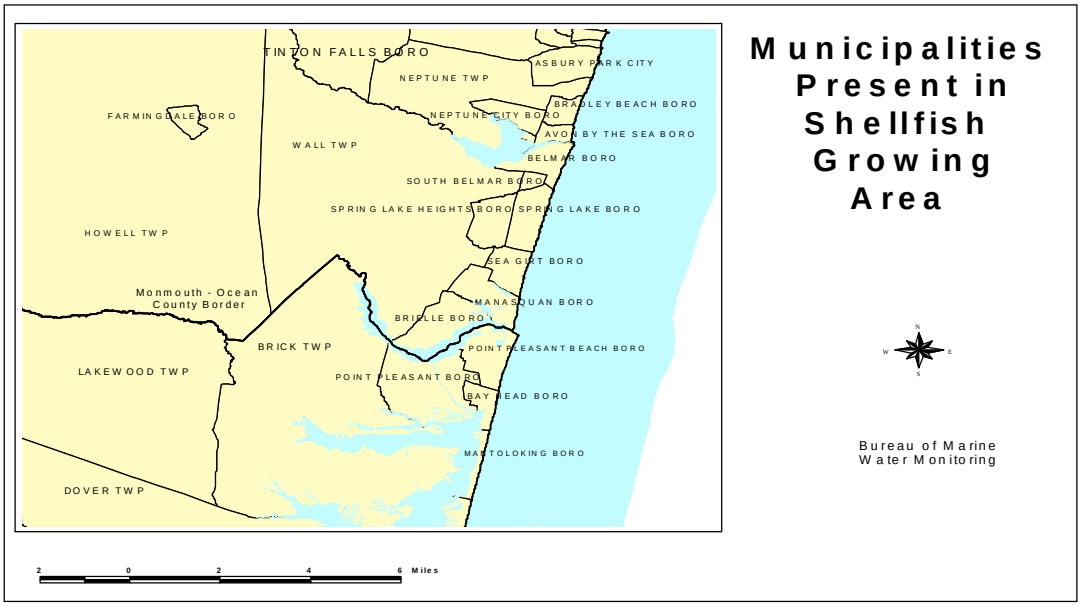


FIGURE 5: MUNICIPALITIES IN PROXIMITY TO SHELLFISH GROWING AREA

TABLE 1: POPULATION INFORMATION FOR SHORELINE MUNICIPALITIES IN SHELLFISH GROWING AREA

Community	Area (sq. mi.)	Population (1990 Census)	Population Density
Avon By The Sea Boro	0.5	2165	4746
Bay Head Boro	0.7	1226	1760
Belmar Boro	1.4	5877	4234
Bradley Beach Boro	0.6	4475	7488
Neptune Township (including Ocean Grove section)	8.8	28,148	3193
Mantoloking Boro	0.7	334	479
Manasquan Boro	1.5	5369	3497
Point Pleasant Beach Boro	1.8	5112	2898
Sea Girt Boro	1.1	2099	1989
Spring Lake Boro	1.4	3499	2483

CHANGES SINCE LAST SURVEY

Two significant changes have been identified since the last sanitary survey. First, several wastewater treatment facilities have been upgraded since the last sanitary survey and are now staffed 24 hours per day and have improved chlorination systems. Upgrades have been performed on the two (2) wastewater treatment facilities present in this shellfish growing area, Neptune Township Sewerage Authority and South Monmouth Regional Sewerage Authority, as well as wastewater treatment facilities present in the next shellfish growing area to the north. As a result of these upgrades, approximately 3629 acres, split between the two areas, with approximately half the waters in each area, of shellfish growing area are planned to be upgraded from *Prohibited* to *Approved* status in both shellfish growing areas.

Second, a new storm water outfall has been built on the ocean shoreline in the area of Bay Head/ Point Pleasant Beach by Ocean County Engineering Department to serve the Sea Avenue Pump Station in Point Pleasant. A proposed 139 acres of shellfish growing area will be closed around this storm water outfall. Please refer to Appendix I

for a copy of the CAFRA Permit from New Jersey Department of Environmental Protection for the construction of the storm water outfall from Sea Avenue Pump Station.

FIGURE 6: STORM WATER OUTFALL FROM SEA AVENUE PUMP STATION – LOCATED IN POINT PLEASANT BEACH

IDENTIFICATION AND EVALUATION OF SOURCES

Wastewater Treatment Facilities

The wastewater treatment facilities operated by Neptune Township Sewerage Authority (NTSA) and South Monmouth Regional Sewerage Authority were visited on May 20 and 25, 1999, respectively. The facilities were inspected utilizing the guidelines contained in the *Guide for the Control of Molluscan Shellfish,* as part of procedures to evaluate compliance of this shellfish growing area with NSSP criteria established in this same document.

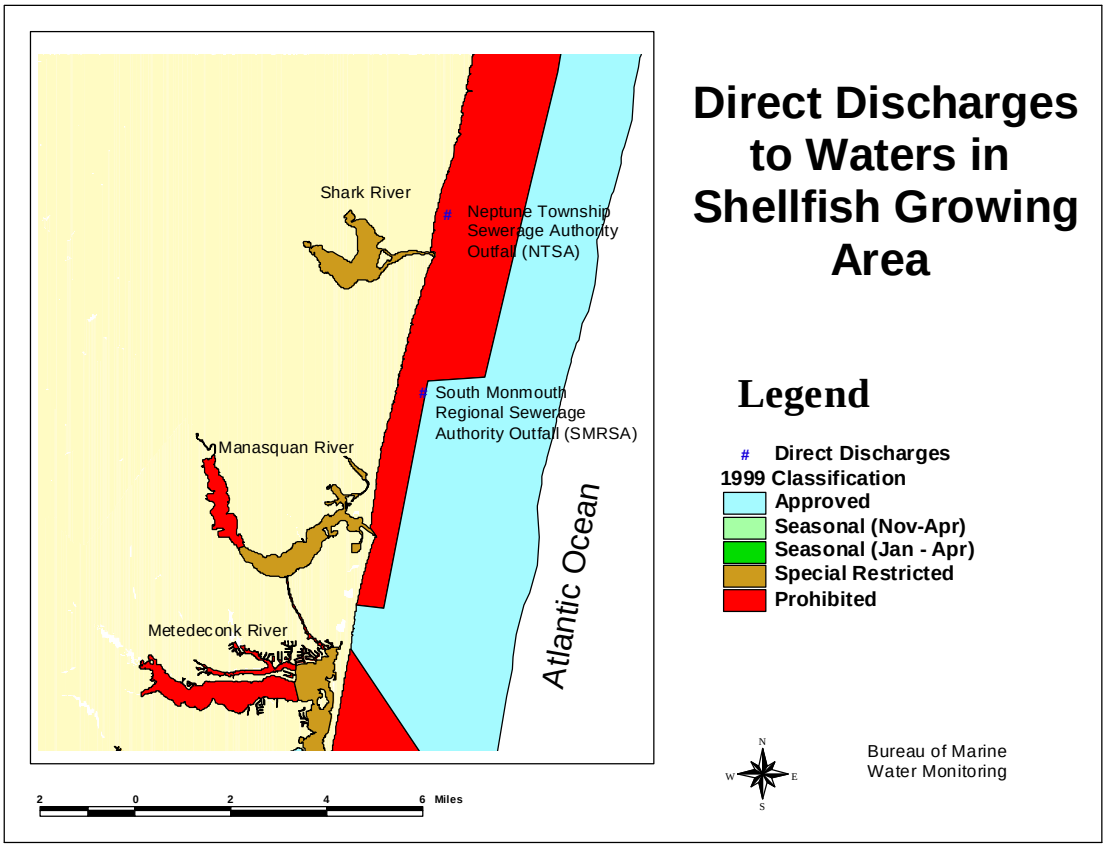


FIGURE 7: DIRECT DISCHARGES TO WATERS IN SHELLFISH GROWING AREA

TABLE 2: DISCHARGES TO SHELLFISH GROWING AREA

Map Key	Discharge Source	Capacity Flow Quantity (MGD)	Current Flow Quantity (MGD)	Average BOD_5 of Effluent (mg/L)	Average Fecal Coliform Counts for Effluent (MPN/ 100 mL)
NTSA	Neptune Township Sewerage Authority	8.5	6.1	19	<2
SMRSA	South Monmouth Regional Sewerage Authority	9.1	5.7	14.5	9

Neptune Township Sewerage Authority

On May 20, 1999, Bonnie Zimmer, Environmental Scientist, and Steven Peters, Environmental Specialist, performed a routine inspection of the Township of Neptune Sewerage Authority, utilizing NSSP guidelines. This facility is located at 634 Old Corlies Avenue in Neptune Township, New Jersey. This facility utilizes trickling filters in order to provide secondary treatment to sewage from Neptune Township, Neptune City, Bradley Beach, Avon-By-The-Sea, Ocean Grove and portions of Wall Township and Tinton Falls.

The facility is designed to handle 8.5 million gallons per day of sewage, but averages between 6 and 6.5 million gallons per day depending on the season. The sewage inflow is primarily sanitary, with some additional amounts from a laundry business and a plating factory. The facility appears to be well maintained and it was observed that efforts are being pursued to replace older parts of the facility with new or refurbished equipment and buildings.

FIGURE 8: TRICKLING FILTER AT NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

The facility was expanded in the late 1980's from its original size of one set of settling tanks and trickling filter to include three (3) treatment trains, each with primary and secondary settling tanks and trickling filters. The influent may be rerouted between the treatment trains, allowing for maintenance of the facility. There are also duplicate chlorine tanks and sludge digesters, which allows the tanks to be taken offline for maintenance. In addition to the typical secondary treatment, the effluent goes through an aerated stabilization pond before going to the outfall pipe. Automatic alarms are online for the single pumping station, located on Laird Avenue in Neptune Township, and for the treatment facility which alert of high water, power failure and breakdown. These alarms go to the operators panel. The panel and plant are physically inspected every hour, 24 hours a day.

FIGURE 9: AERATION POND AT NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

The facility handles average daily flows of between 6 and 6.2 million gallons per day, with a peak flow during the last year of 10.7 million gallons per day, after a significant rainfall. The facility is designed for a flow of 8.5 million gallons per day. The effluent being discharged had the following characteristics for five day Biological Oxygen Demand (BOD_5), Suspended Solids and effluent fecal coliform levels for 1998.

TABLE 3: BIOLOGICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND FECAL COLIFORM IN 1998 FOR NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

	Summer Months (June, July, August)	**Winter Months** (December, January, February)
BOD_5 (mg/L)	13	25
Suspended Solids (mg/L)	12	16
Effluent Fecal Coliform (MPN Counts/100 mL)	<2	<2

TABLE 4: METEOROLOGICALLY RELATED FLOWS IN 1998 FOR NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

	Dry Weather	Wet Weather
Average Daily Flow (MGD)	4.8	N/A
Peak Hourly Flow (MGD)	N/A	10.7

FIGURE 10: CHLORINATION TANK AT NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

Disinfection is achieved through continuous chlorination with sodium hypochlorite. Two (2) - 3000 gallon tanks and one (1) – 1000 gallon tank feed sodium hypochlorite, with an average daily feed rate of 1000 gallons of sodium hypochlorite. In addition, two (2) – 1000 gallon tanks are available for chlorination at the aeration pond, although one was down for maintenance at the time of observation. There are no chlorine alarm systems for failure of the chlorination system, however there is a leakage alarm. Each sodium hypochlorite tank had a calibrated visual indicator to allow metering of the amount of chlorinating agent present in the tanks.

Chlorine residual is monitored with nine (9) grab samples per day, with an

average chlorine residual around .5 ppm at the outfall. The outfall pipe releases to the Atlantic Ocean, 6080 feet offshore at Bradley Beach. Effluent bacterial testing is performed year round with one sample per day in each of three locations, with an additional location added during the summer. Effluent fecal coliform levels were consistently under 2 counts per 100 mL.

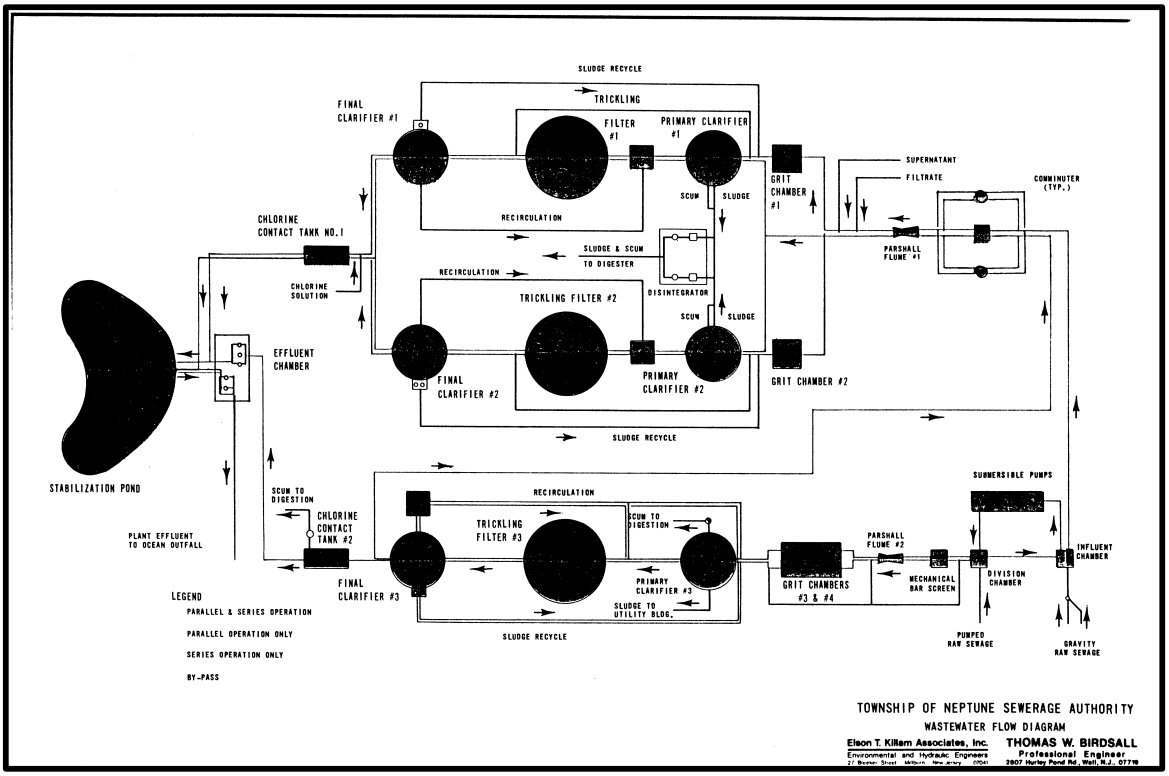


FIGURE 11: SCHEMATIC OF THE TREATMENT SYSTEM AT NEPTUNE TOWNSHIP SEWERAGE AUTHORITY

South Monmouth Regional Sewerage Authority

On May 25, 1999, Debbie Watkins, Senior Environmental Specialist, and Steven Peters, Environmental Specialist, performed a routine inspection of the South Monmouth Regional Sewerage Authority, utilizing NSSP guidelines. This facility is located at 1235 18th Avenue in Belmar, New Jersey. NSSP guideline were utilized for this inspection. This sewage treatment facility utilizes trickling filters in order to provide secondary treatment to sewage from Belmar, South Belmar, Brielle, Manasquan, Sea Girt, Spring Lake, Spring Lake Heights and Wall Township.

The facility is designed to handle 9.1 million gallons per day of sewage, but

averages between 4.7 and 6.7 million gallons per day depending on the season. The sewage inflow is sanitary, no industries discharge to the sewers which feed to this facility. The facility appears to be well maintained and at the time of the observation one of the trickling filters was being disassembled for renovation.

FIGURE 12: TRICKLING FILTER UNDER RENOVATION AT SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

The facility has two (2) trickling filters with serial routing. Sewage flows through a primary settling tank to the first trickling filter. After the first trickling filter, the sewage flows through an intermediate settling tank and into a second trickling filter. After the second trickling filter, the sewage flows to the final settling tank, after which it is chlorinated. Once the effluent is chlorinated, it is held in an aeration pond and then an equalization pond before being released to the Atlantic Ocean.

The flow of sewage through the treatment system may be rerouted to allow for maintenance and repair of the facility, at which time the treatment system becomes a single trickling filter with primary and secondary settling tanks. At the time of observation, the facility was functioning as a single trickling filter with primary and secondary settling tanks, due to the renovation of one of the trickling filters.

There are eleven (11) pumping stations connected to this facility. One (1) pumping station is located in each of the

following locations; Belmar, South Belmar, Wall, Spring Lake, Spring Lake Heights, Wreck Pond, Sea Girt and Brielle. Two (2) pumping stations are present in each of the following municipalities; Manasquan and Spring Lake. Automatic alarms are online for all the pumping stations and the treatment facility which alert of high water, power failure and breakdown. These alarms go to the operators panel. The panel and plant are physically inspected every hour, 24 hours a day.

FIGURE 13: CONTROL PANEL WITH A MAP DETAILING THE LOCATIONS OF THE PUMPING STATIONS WHICH FEED INTO SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

Each individual municipality is responsible for the sewer line which feeds into the pumping stations. Until recently, inflow and infiltration has not been an important issue for South Monmouth Regional Sewerage Authority because incoming sewage was consistently less than the design capacity of the treatment system.

However, as the municipalities have increased in population, extraneous flows are beginning to place an increased strain on the treatment system. South Monmouth Regional Sewerage Authority has met with officials from the municipalities for which it treats the wastewater in order to propose a program designed to decrease the amount of inflow and infiltration.

Five of the eight municipalities have agreed to participate in the program. The remaining three municipalities are planning to develop their own programs

to reduce inflow and infiltration. This plan is currently in the stage of being engineered.

The facility handles average daily flows of between 4.7 and 6.7 million gallons per day, with a peak flow during the last year of 8.9 million gallons per day after a significant rainfall. The facility is designed for a flow of 8.5 million gallons per day. The effluent being discharged had the following characteristics for five day Biological Oxygen Demand (BOD_5), suspended solids and effluent fecal coliform levels.

TABLE 5: BIOLOGICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND FECAL COLIFORM IN 1998 FOR SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

	Summer Months (June, July, August)	**Winter Months** (December, January, February)
BOD_5 (mg/L)	13	25
Suspended Solids (mg/L)	12	16
Effluent Fecal Coliform (MPN Counts/100 mL)	12	7

TABLE 6: METEOROLOGICALLY RELATED FLOWS IN 1998 FOR SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

	Dry Weather	**Wet Weather**
Average Daily Flow (MGD)	4.7	N/A
Peak Hourly Flow (MGD)	N/A	8.9

FIGURE 14: FINAL SETTLING TANKS AT SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

Disinfection is achieved through continuous chlorination with sodium hypochlorite. Three (3) - 3000 gallon tanks feed sodium hypochlorite, with an average daily feed rate of 480 gallons of sodium hypochlorite. The only chlorine alarm system on line is for leakage. No alarms are on line for failure of the chlorination system, but the recorder and status of the tank are checked once per hour.

Chlorine residual is monitored with three (3) grab samples per day, with an average chlorine residual around .125 mg/L at the outfall. The outfall pipe releases to the Atlantic Ocean, offshore of Lake Como in Belmar. Effluent bacterial testing is performed once per week. Effluent fecal coliform levels were consistently between 7 and 12 MPN per 100 mL. South Monmouth Regional Sewerage Authority is currently involved in an on going cooperative study with Rutgers University to ascertain the effects of chlorine from the sewage discharge on marine biota at the outfall.

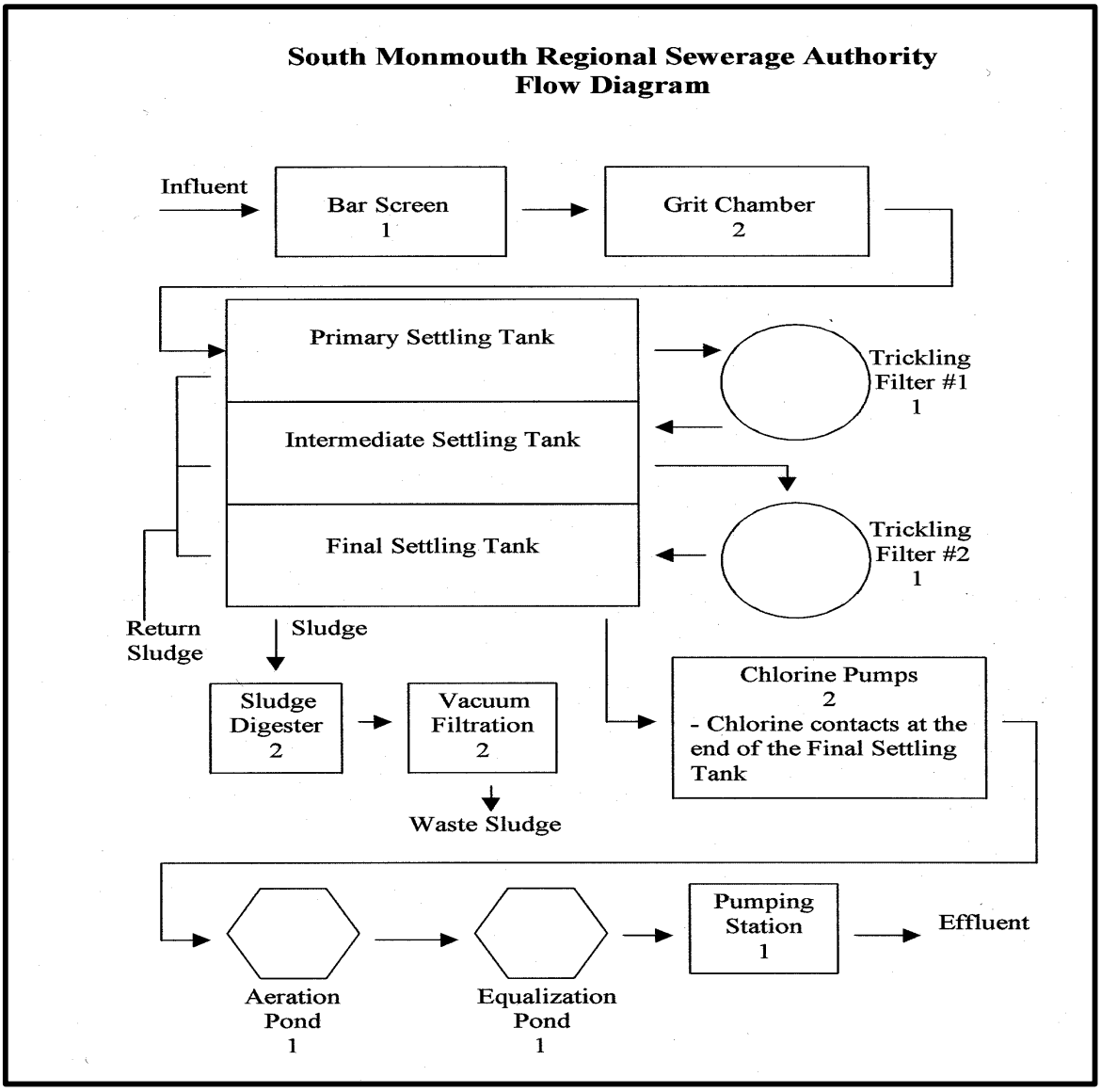


FIGURE 15: SCHEMATIC OF THE TREATMENT SYSTEM AT SOUTH MONMOUTH REGIONAL SEWERAGE AUTHORITY

Indirect Discharges

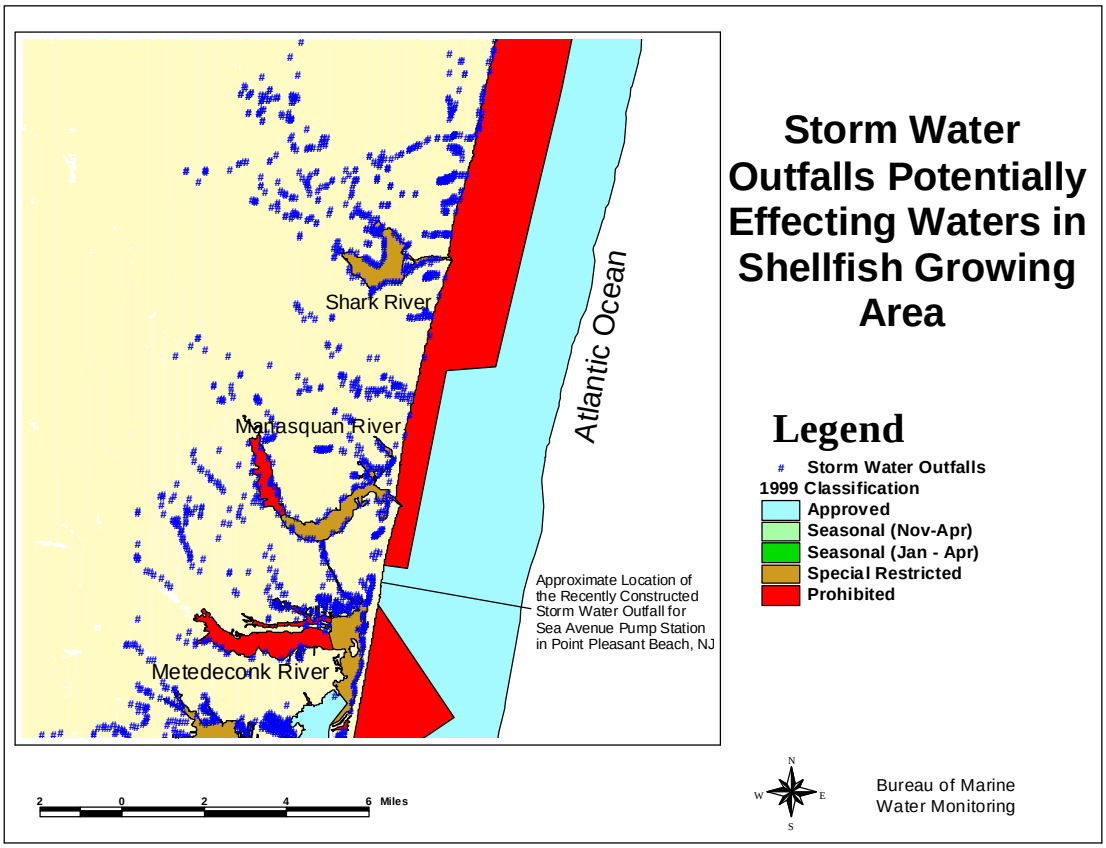


FIGURE 16: STORM WATER OUTFALLS POTENTIALLY EFFECTING THE WATERS IN SHELLFISH GROWING AREA

In addition to the direct discharges from the wastewater treatment facilities already discussed, significant impact to the area comes from indirect discharges through non-point sources. The primary conduits for the non-point sources to reach the shellfish growing area are storm water outfalls. There are numerous storm water outfalls located along the shoreline and along the streams and waterways in this area. Due to the predominant land use in the area being developed urban land, runoff from rain events can carry a variety of materials including fecal waste from domestic pets and feral animals living in proximity to the urban areas, such as birds, squirrels and raccoons. The runoff may wash down additional material such as waste from road kill and petroleum products spilled from automobiles and fertilizer.

Storm water runoff is directly discharged to ocean waters through storm water outfalls along the shoreline. Storm water outfalls also discharge to lakes and rivers, and their tributaries.

Another potential indirect source of pollution is sites contaminated with

hazardous materials in proximity to this area. There are numerous known contaminated sites in the municipalities along the shoreline, but none of them are located adjacent to the shoreline and therefore are unlikely to have a significant impact on bacteriological water quality in the shellfish growing area. There are no indications that any impacts to the shellfish growing waters came from these contaminated sites.

On June 18, 1999, field observations were made of a series of fresh water lakes and two river inlets located in the area. The lakes are unusual hydrogeological formations because they are fresh water bodies in close proximity to the ocean, generally less than one mile from the shoreline, which generally do not either discharge to or exchange water with the ocean. These lakes include Wesley Lake, Fletcher Lake, Sylvan Lake, Silver Lake and Lake Como, as well as a few other smaller unnamed water bodies which are further back from the shoreline. There are also several other lakes of this type located on the northern part of the New Jersey Atlantic Ocean shoreline in other shellfish growing areas. These lakes are terminal fresh water bodies which do not flow any further towards the ocean. Some of the lakes are separated from the ocean waters by distances of land preventing interaction. Several other lakes have floodgates to prevent interaction with the ocean waters. The only time interaction between waters from these water bodies and the ocean will occur is during strong storms.

FIGURE 17: SYLVAN LAKE WITH FLOODGATE IN FOREGROUND

The waters in these lakes tend to carry a heavy organic load from a variety of sources including tributaries flowing into the lakes, storm water runoff routed into the water bodies through storm water outfalls, large indigenous waterfowl populations and nutrient loading from manicured lawns close to the lakes. As a result of the organic loads which impact the waters of the lakes, the lakes tend to be highly eutrophic. Due to the water conditions in the lakes, impact to the potion of the shellfish growing areas immediately adjacent to the shoreline can be significant when the waters interact.

FIGURE 18: FLETCHER LAKE WITH CORMORANT POPULATION

FIGURE 19: A FLOCK OF SWANS AT LAKE COMO

Wreck Pond is the exception among these water bodies because it discharges to the ocean via tidal exchange through a seven (7) foot diameter beachfront outfall pipe. Sections of Wall Township, Spring Lake, Spring Lake Heights and Sea Girt all use Wreck Pond and its tributaries as receiving waters for storm water runoff. Additionally, subsurface disposal of sanitary waste which is utilized in some of the more rural areas of Wall Township has potential to impact Wreck Pond and its tributaries. Fecal waste from a large indigenous waterfowl population may also impact Wreck Pond.

As is typical of impoundments, contaminants in Wreck Pond could have a tendency to accumulate, increasing the likelihood of a significant impact to waters immediately adjacent to the shoreline.

However, no indications of impacts to the ocean waters have been detected in results from sampling of the ocean waters, so the impact may be occasional. *Prohibited* areas maintained along the shoreline as a safety buffer zone prevent any impacts to *Approved* waters. During a field investigation of Wreck Pond on June 18, 1999, it was observed that construction was being performed on the outfall pipe.

FIGURE 20: WRECK POND

FIGURE 21: CONSTRUCTION BEING PERFORMED ON THE OUTFALL PIPE FOR WRECK POND

The ebbing waters from both the Shark and Manasquan Rivers also have the potential to adversely effect the water quality in the growing area. All of Shark River and the major portion of the Manasquan River are currently classified as *Special Restricted*, which means shellfish harvested in this area are required to undergo purification in "clean" water through relay or depuration before they can be marketed as food stock. Both river systems receive substantial quantities of storm water runoff from the urban developed shoreline communities.

FIGURE 22: SHARK RIVER INLET

FIGURE 23: MANASQUAN RIVER INLET

Another potential indirect source of pollution is sites contaminated with hazardous materials in proximity to this area. There are numerous known contaminated sites in the municipalities along the shoreline, but only a few are located near the shoreline. There are no known contaminated sites or toxic release sites directly along the shoreline. There are no indications that any impacts to the shellfish growing waters came from these contaminated sites.

It should be noted that all discharge sources are buffered from the *Approved* waters by closed safety zone with a *Prohibited* waters area.

Spills or Other Unpermitted Discharges

There were no spills to ocean waters recorded in proximity to this area during the time period covered by this report.

HYDROGRAPHY AND METEOROLOGY

The area around the shoreline consists of urban development with beaches along the shoreline maintained primarily for recreational bathing purposes. All communities along the shoreline are connected to sanitary sewers. Some of the rural areas of Wall Township utilize subsurface disposal systems for sanitary wastes, but these areas are distant from the shoreline and would have no impact on the ocean shellfish waters.

Waters from Wreck Pond, as noted above, can potentially impact near shore waters. Subsurface disposal systems do impact Wreck Pond though. Impacts of subsurface disposal systems on Wreck Pond are only one of many impacts including storm water runoff and droppings from a large indigenous waterfowl population. The area near where Wreck Pond interacts with near shore waters is classified as *Prohibited* and ensures a safety zone.

The urban development along the shoreline results in large amounts of storm water runoff. The storm water runoff is collected in storm drains and discharged via storm water outfalls to various points along the shoreline into the ocean or to rivers, lakes or ponds and their tributaries which are in the proximity of the area.

There has been only one significant change in hydrography since the last reappraisal performed in May 1996. A new storm water outfall has been constructed on the beach in Point Pleasant Beach. An area of 139 acres will be closed and classified as *Prohibited* to provide a safety buffer zone around this storm water outfall.

The primary weather station for this area is Toms River. The secondary weather station for this area is Long Branch. The secondary station data is used when data from the primary station are incomplete.

There are no indications that any large storms, hurricanes or noreasters, caused conditions of elevated coliform levels in the area. The only hurricane which approached in close proximity to the area was during 1996, at which time a hurricane which had lost intensity went through New Jersey. Large storms did not constitute significant impacts to shellfish in this area.

None of the results from the sampling stations exhibited effects from rainfall. There is no reason to alter the sampling stations utilized in obtaining the data for this report in the future due to rainfall amounts. Rainfall has very little effect on the results obtained from samples taken from ocean waters.

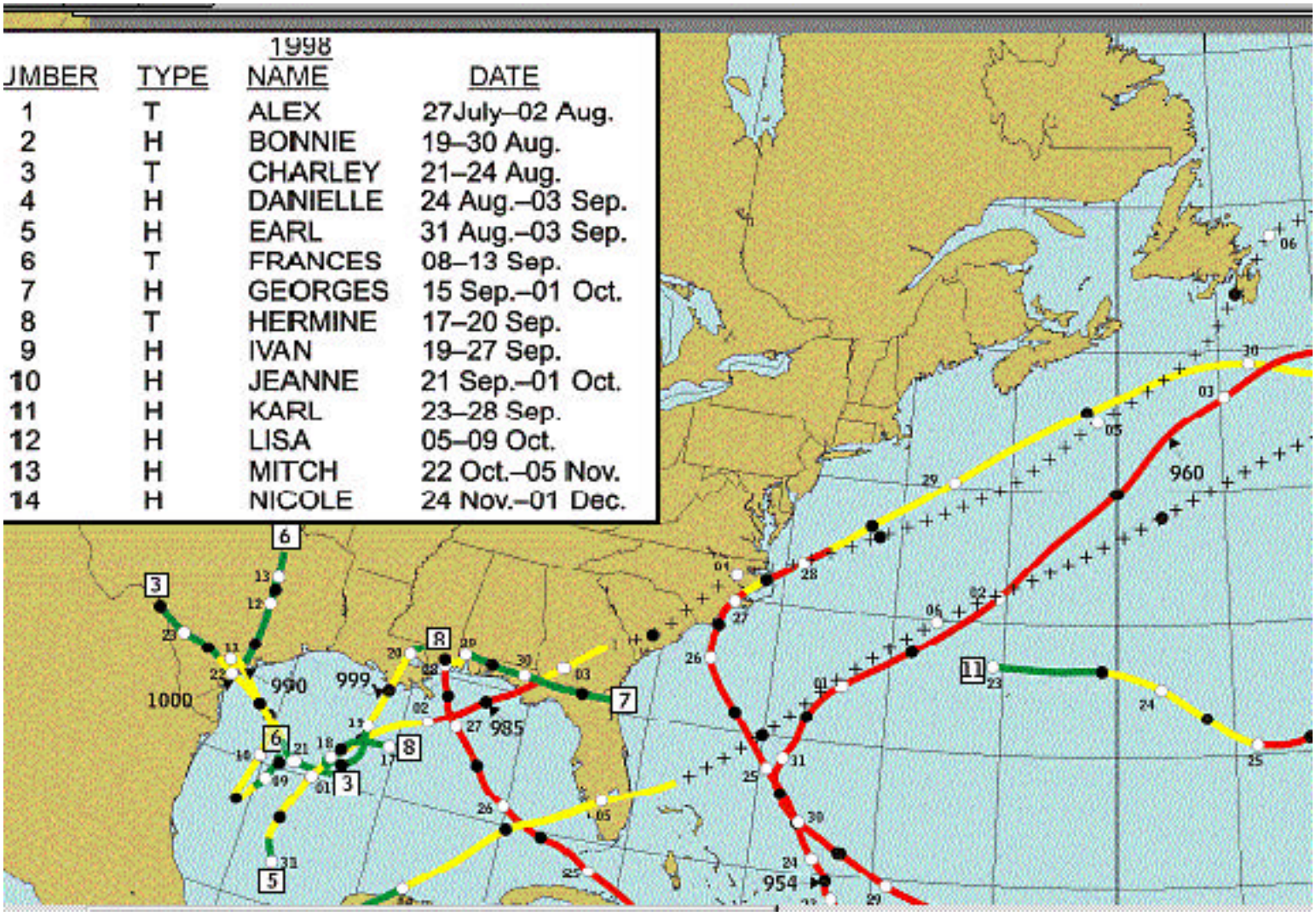


FIGURE 24: 1998 HURRICANE TRACKING MAP

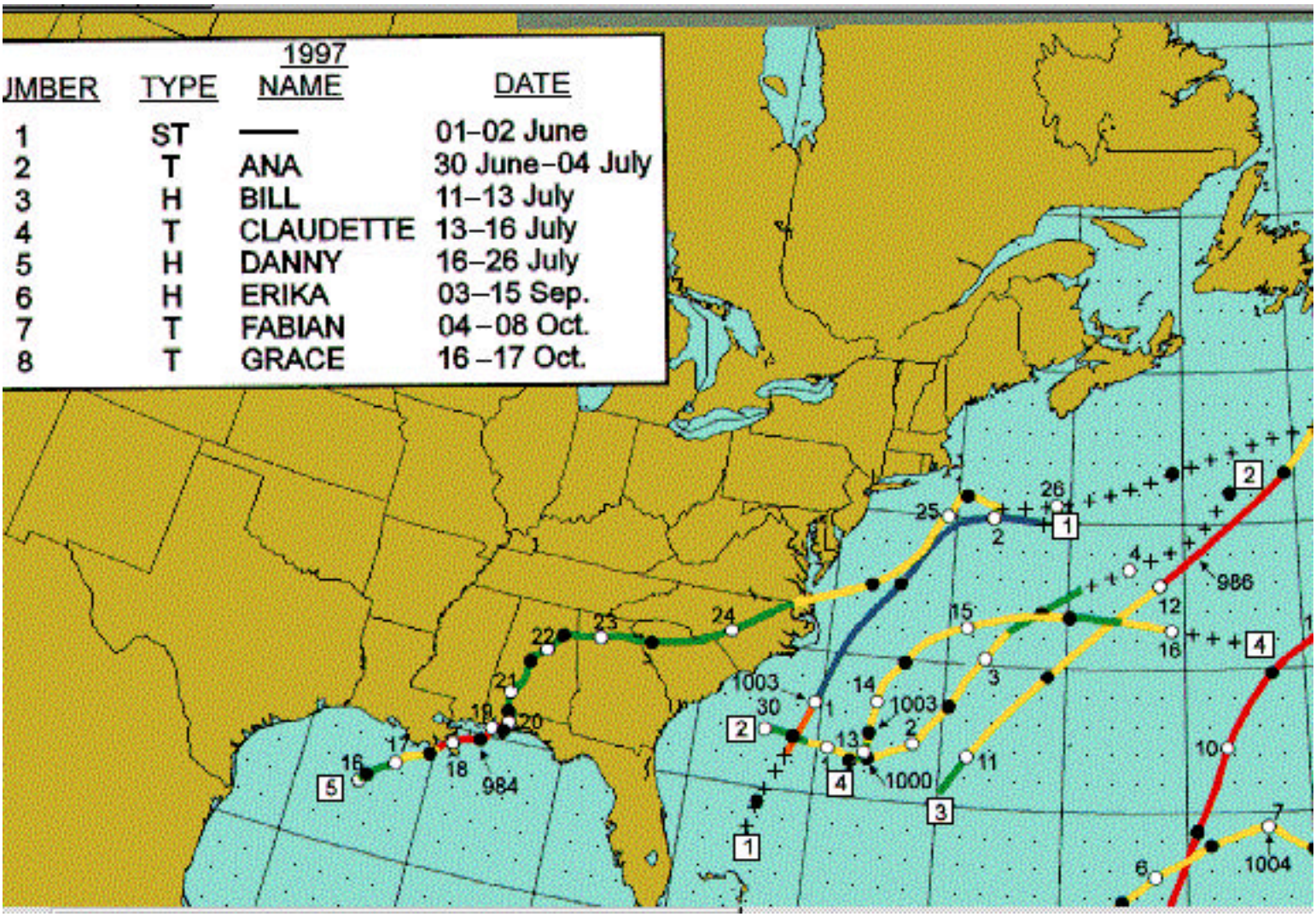


FIGURE 25: 1997 HURRICANE TRACKING MAP

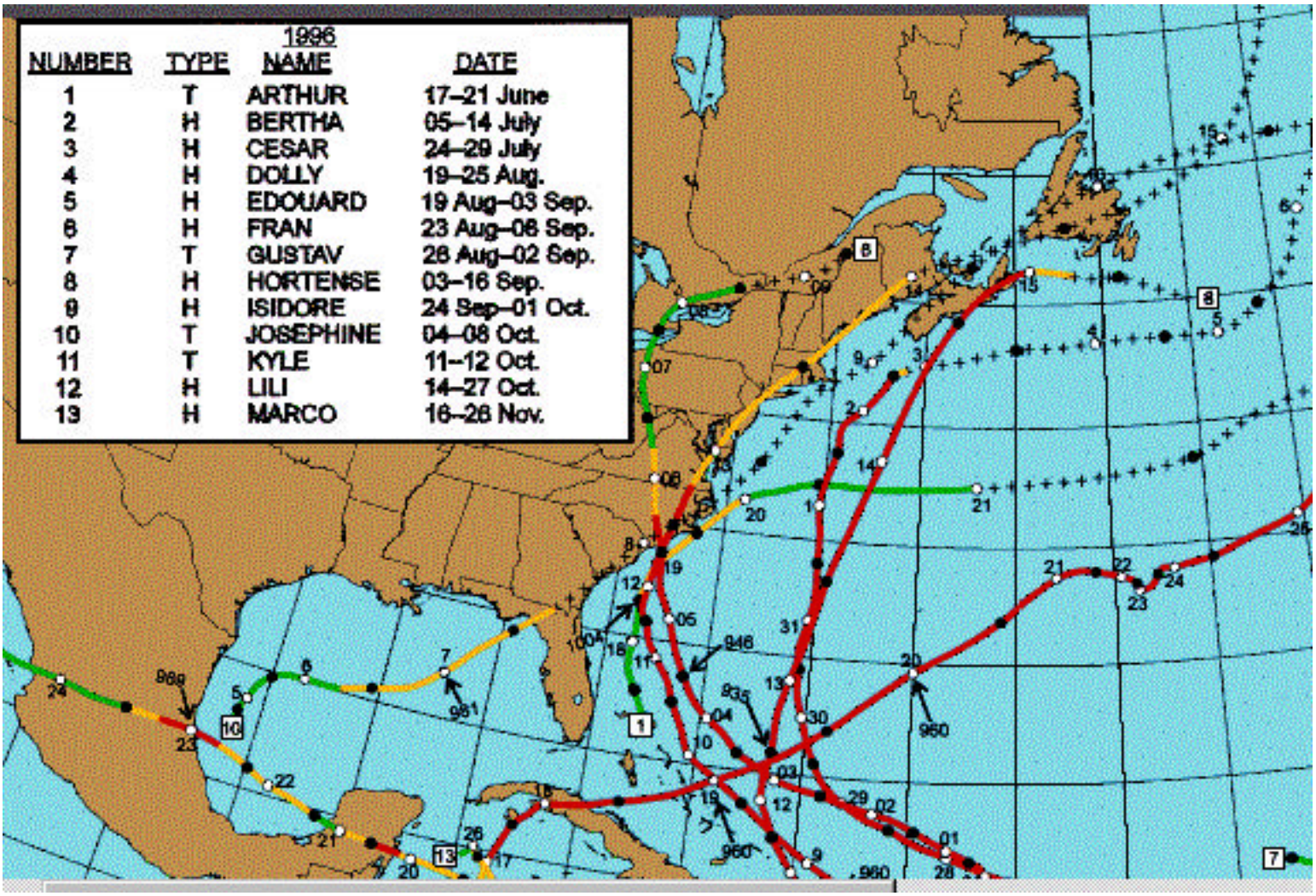


FIGURE 26: 1996 HURRICANE TRACKING MAP

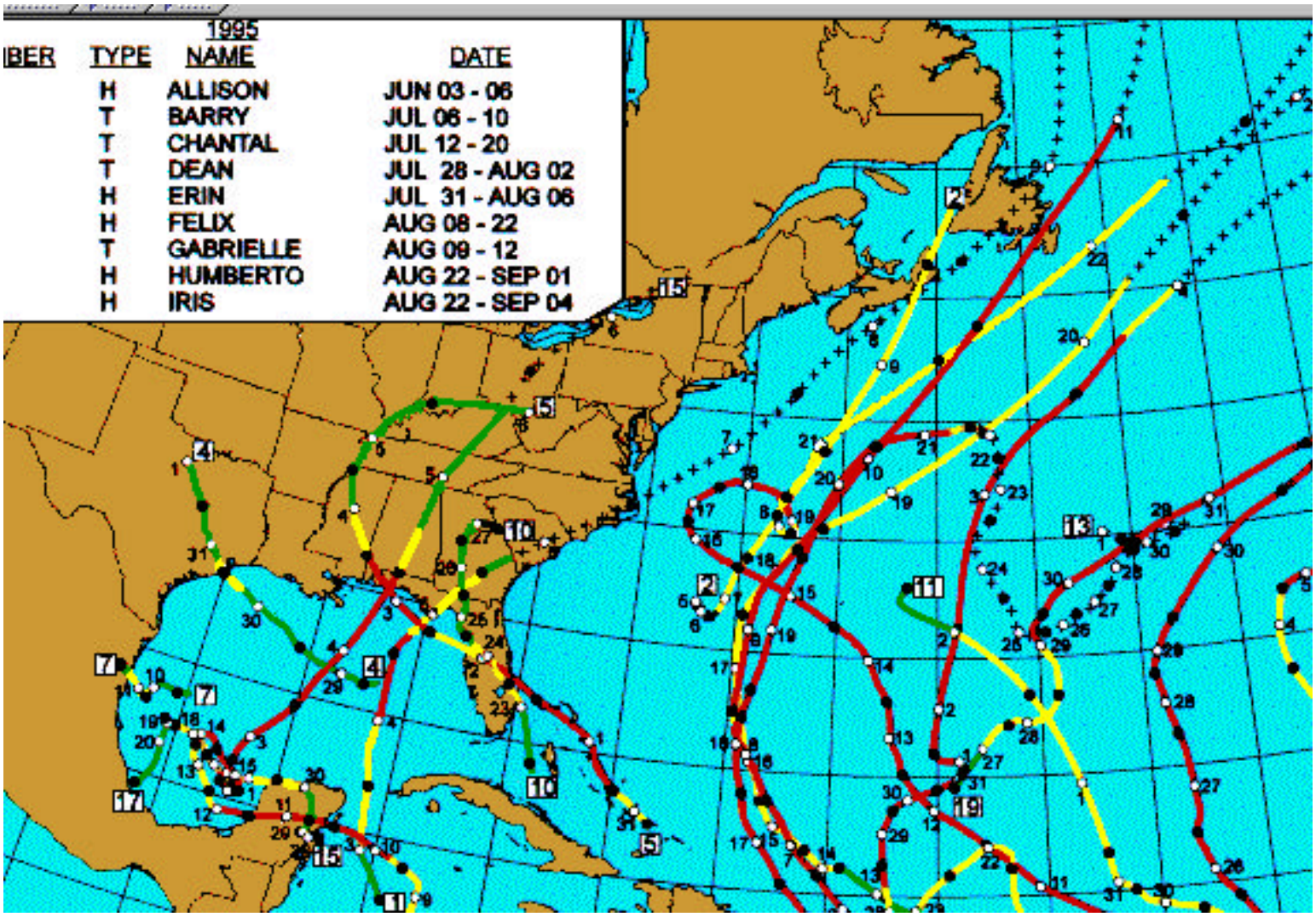


FIGURE 27: 1995 HURRICANE TRACKING MAP

TABLE 7: CLIMATOLOGICAL DATA

Rainfall Recorded at NOAA's Toms River Station at 0800 hrs; Wind and Temperature aboard sampling vessel at time of sample collection

Sampling Date	Precipitation in Inches			Wind		Temperature	
	Day of Sampling	24 Hours Prior	48 Hours Prior	Direction	Velocity	Air °C	Water °C
2/16/95	0.38	0.38	0.38	NW	8	6	4
5/4/95	0	0.45	0.45	SE	6	15	13
8/22/95	0	0	0	NE	15	28	24
10/13/95	0	0	0	SE	6	25	18
3/13/96	0	0	0	SE	7	4	ND
4/15/96	0.005	0.005	0	S	10	8	ND
7/9/96	0.27	0.27	0.27	ND	ND	25	ND
7/22/96	0	0	0	ND	ND	21	ND
8/22/96	0	0	0	S	2	26.5	24.5
10/24/96	0.04	0.04	0.07	W	10	14.3	16
9/2/97	2.22	0.02	0.02	SW	10	24.5	21
9/15/97	0.005	0.005	0.005	N	0	21	22
9/17/97	0	0	0	NE	10	21	22
11/20/97	0	0	0	SW	5	9.8	11.5
3/24/98	0	0	0.63	W	5	4.8	5.6
3/31/98	0	0	0	S	11	13	ND
6/17/98	0.1	0.22	1.03	W	6	23	ND
9/24/98	0	0.5	0.6	SW	3	15	21
9/29/98	0	0.01	0.01	NW	4	17	ND
3/17/99	1.70	1.70	1.70	W	5	12	3
4/21/99	0.105	0.1	0	ND	ND	8	ND

Note: ND means that no data was available for the given parameter on that date. Data was primarily obtained from the NOAA weather station and from measurement obtained in the field. However, some missing data was obtained from the NOAA CLIMVIS website and Northeast Regional Climate Center, Cornell University, NOAA affiliate station website.

WATER QUALITY STUDIES

BACTERIOLOGICAL QUALITY

The Adverse Pollution Condition Strategy was utilized for sampling to monitor for contamination in this area. The Adverse Pollution Condition Strategy was utilized in this shellfish growing area because of the presence of two (2) direct discharges, wastewater treatment facility outfalls from Neptune Township Sewerage Authority and South Monmouth Regional Sewerage Authority.

Water sampling for analysis was conducted on 18 surface stations, with between 17 and 21 samples at each station between 1995 and 1999. Six (6) of the sampling stations also had samples taken from the ocean bottom. The bottom samples were taken from sampling stations which are close to active or closed wastewater treatment plant outfalls.

The water quality data collected for this area between January 1995 and April 1999 showed that the results from all sampling stations monitored in the area met the criteria for *Approved* waters. There were no instances of a specific date having numerous sampling stations with high coliform counts. This illustrates that waters designated as *Approved* maintain water quality which is conducive to harvested shellfish which are safe for consumption.

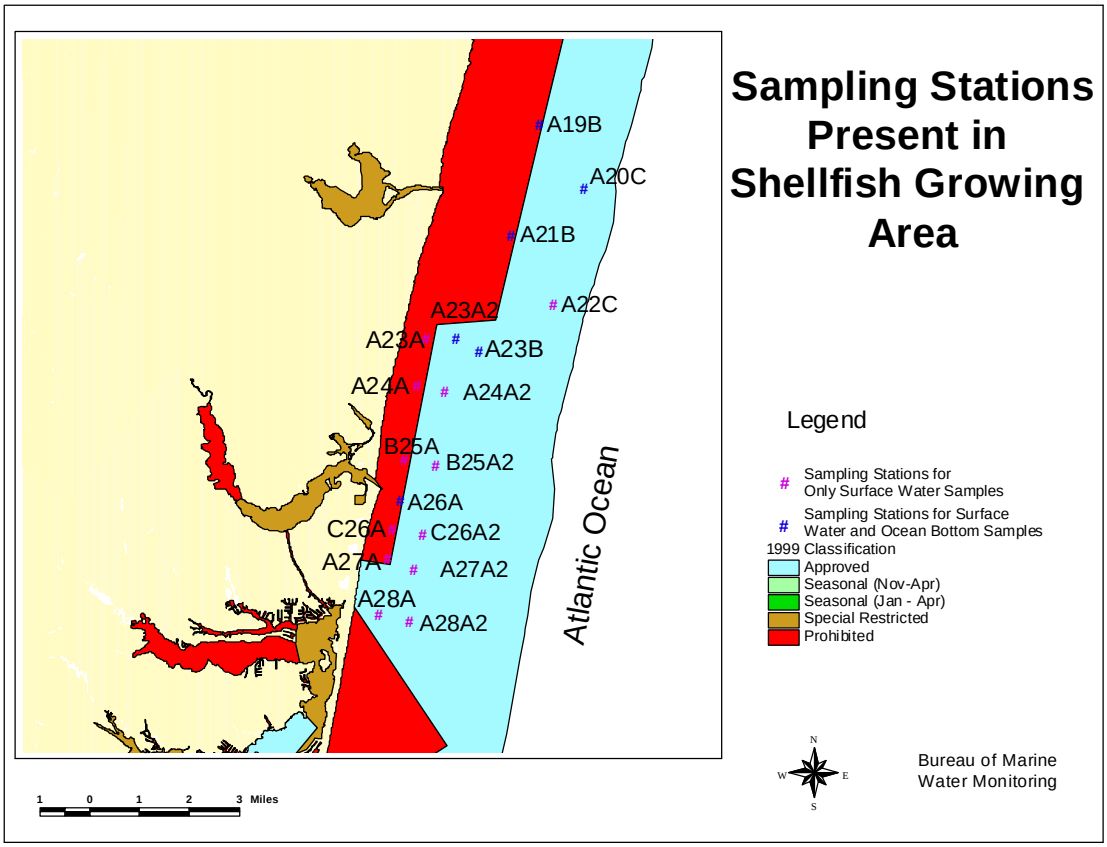


FIGURE 28: SAMPLING STATIONS IN SHELLFISH GROWING AREA

TABLE 8: SUMMARY OF DATA FROM SAMPLES TAKEN FOR ANALYSIS IN SHELLFISH GROWING AREA

Total Coliform Statistical

From: *2/16/95* ***to*** *4/21/99*

Station	*Depth*	*Year Round*			*Summer*			*Winter*		
		Geometric Mean	*%>330*	*N*	*Geometric Mean*	*%>330*	*N*	*Geometric Mean*	*%>330*	*N*
A19B	Surface	3.1	0.0%	20	3.3	0.0%	10	3.0	0.0%	10
A19B	Bottom	3.3	0.0%	18	3.6	0.0%	9	3.0	0.0%	9
A20C	Surface	3.1	0.0%	20	3.1	0.0%	10	3.1	0.0%	10
A20C	Bottom	4.3	0.0%	18	3.6	0.0%	9	5.3	0.0%	9

Station	Depth	Year Round Geometric Mean	%>330	N	Summer Geometric Mean	%>330	N	Winter Geometric Mean	%>330	N
A21B	Surface	3.4	0.0%	20	3.9	0.0%	10	3.0	0.0%	10
A21B	Bottom	3.7	0.0%	18	4.5	0.0%	9	3.1	0.0%	9
A22C	Surface	3.3	0.0%	21	3.6	0.0%	11	3.0	0.0%	10
A23A	Surface	3.3	0.0%	21	3.6	0.0%	11	3.0	0.0%	10
A23A2	Surface	3.8	4.8%	21	4.7	9.1%	11	3.1	0.0%	10
A23A2	Bottom	3.0	0.0%	18	3.1	0.0%	9	3.0	0.0%	9
A23B	Surface	3.5	0.0%	21	3.5	0.0%	11	3.4	0.0%	10
A23B	Bottom	3.3	0.0%	18	3.4	0.0%	9	3.1	0.0%	9
A24A	Surface	3.2	0.0%	21	3.3	0.0%	11	3.2	0.0%	10
A24A2	Surface	3.9	0.0%	19	5.2	0.0%	9	3.1	0.0%	10
A26A	Surface	5.5	0.0%	21	5.6	0.0%	11	5.3	0.0%	10
A26A	Bottom	3.3	0.0%	17	3.6	0.0%	8	3.1	0.0%	9
A27A	Surface	4.2	0.0%	21	4.6	0.0%	11	3.8	0.0%	10
A27A2	Surface	4.5	4.8%	21	5.6	9.1%	11	3.5	0.0%	10
A28A	Surface	3.1	0.0%	20	3.2	0.0%	10	3.1	0.0%	10
A28A2	Surface	3.0	0.0%	19	3.0	0.0%	9	3.1	0.0%	10
B25A	Surface	5.1	4.8%	21	5.9	9.1%	11	4.4	0.0%	10
B25A2	Surface	3.8	0.0%	21	4.7	0.0%	11	3.1	0.0%	10
C26A	Surface	4.8	0.0%	21	5.3	0.0%	11	4.4	0.0%	10
C26A2	Surface	5.4	0.0%	20	7.5	0.0%	10	3.8	0.0%	10

RELATED STUDIES

Two related studies were performed in this area. First, four (4) nutrient level samples are collected each year in this area. The results of the nutrient level sampling are compiled into a separate report by the Bureau of Marine Water Monitoring. Second, data is collected as part of the phytoplankton monitoring program for which the Department collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. This data is evaluated weekly by the Bureau of Marine Water Monitoring in accordance with the NSSP requirements. This was formerly discussed on page 9.

INTERPRETATION AND DISCUSSION OF DATA

BACTERIOLOGICAL

Criteria for acceptability of shellfish growing water based on bacterial parameters are provided in the *Guide for the Control of Molluscan Shellfish, Part IV, Shellfish Growing Areas* (USPHS, 1997, revision). Each state must adopt either the total coliform criteria or the fecal coliform criteria for growing water classifications. Historically, the New Jersey Department of Environmental Protection has based growing water classification on the total coliform criteria and continues to use total coliform criteria.

The total coliform standard does not need to be applied if it can be shown by detailed study of laboratory findings that the coliform are not of direct fecal origin and do not indicate a public health hazard. The New Jersey Department of Environmental Protection takes corresponding samples for fecal coliform analysis with each sample taken for total coliform analysis, however this data is utilized as adjunct information and is not used for classification of shellfish growing waters. Data analysis is based on the total coliform results. The total coliform geometric mean MPN for *Approved* classification must not exceed 70 counts/100 mL and not more than 10% of the samples can exceed an MPN of 330 counts/ 100 mL, where the three tube decimal dilution test is used. Areas classified as *Special Restricted* must meet the criteria of 700 counts/100 mL and have fewer than 10% exceed a MPN of 3300 counts/ 100 mL.

A total of 476 water samples from 24 stations were analyzed by the laboratory of the Bureau of Marine Water Monitoring at Leeds Point for total coliform (TC) and fecal coliform (FC) bacteria during the period of time from January 1, 1995 to April 21, 1999. The water quality data was evaluated using criteria applicable to the Adverse Pollution Condition Strategy.

The results of the data collected from sampling in this shellfish growing area indicated that all *Approved* waters met the criteria for classification as *Approved*. There was very little variability in the data with no significant fluctuations between data from different seasons and tidal conditions. There were several isolated data results which were abnormally high (between 150 MPN counts/100 mL and 2400 MPN counts/100 mL). There was no pattern to any of these elevated results, and they are believed to be a function of inherent biological variability.

CONCLUSIONS

BACTERIOLOGICAL EVALUATION

Based on water quality data obtained from sampling between January 1995 and April 1999, all areas classified as *Approved* waters in this area continued to meet NSSP criteria for the *Approved* classification. There were no indications that discharges from Neptune Township Sewerage Authority and South Monmouth Regional Sewerage Authority wastewater treatment plants impacted the *Approved* waters of this shellfish growing area. There were also no indications that indirect discharges from storm water outfalls caused significant impacts to the *Approved* waters of this area. The *Prohibited* areas in this shellfish growing area provide a safety zone which helps ensure the continued quality of the *Approved* waters. Additionally, the safety zone formed by the *Prohibited* water areas also functions to ensure that if any discharges occurred from any of the wastewater treatment plants or storm water outfalls, there would be sufficient time to close the impacted waters to continued harvest before the discharge reaches *Approved* waters.

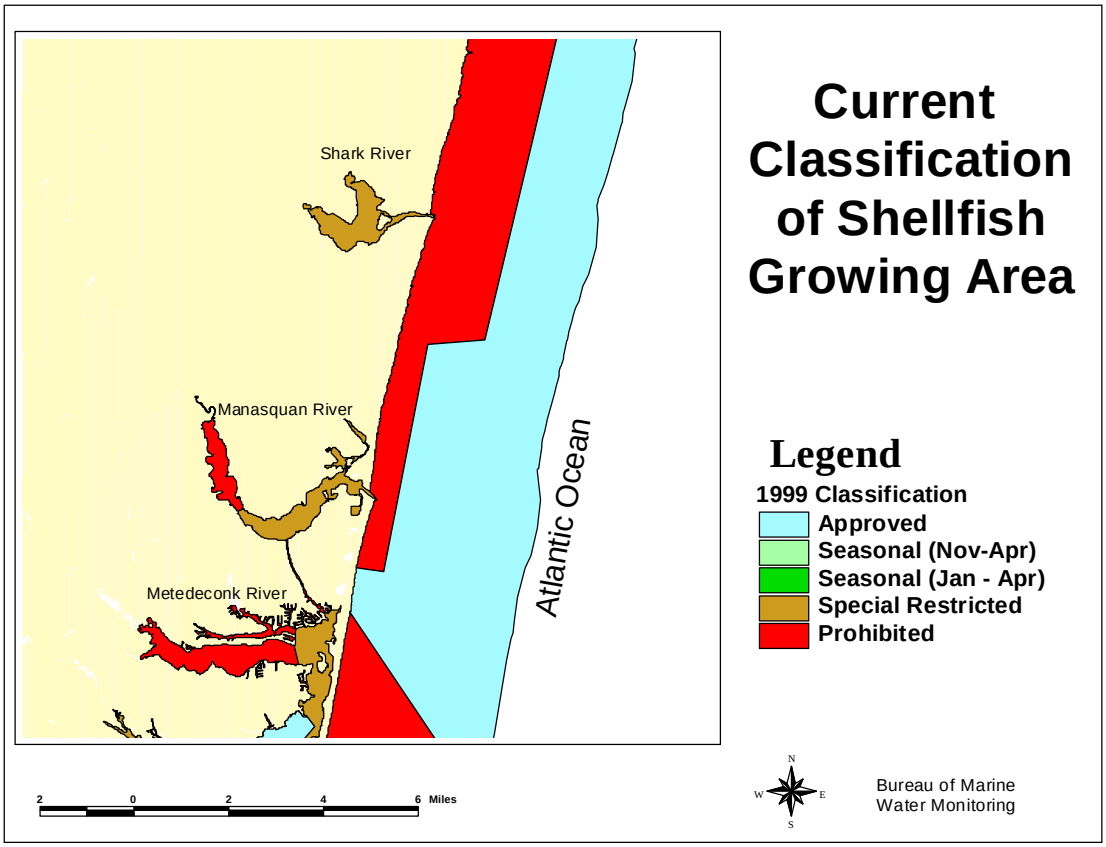


FIGURE 29: CURRENT CLASSIFICATION FOR SHELLFISH GROWING AREA

RECOMMENDATIONS

BACTERIOLOGICAL EVALUATION

There are two (2) recommended changes for classification in this area. First, 139 acres around the storm water outfall recently constructed by Ocean County Engineering Department in Point Pleasant Beach for Sea View Avenue Pump Station should be closed and classified as *Prohibited*. This new *Prohibited* area will be a strip connecting the *Prohibited* areas that are preexisting to the north and south. This is due to the presence of the recently constructed storm water outfall from Sea Avenue Pump Station in Point Pleasant

Beach. Second, a strip consisting of 1815 acres of *Prohibited* area on the outer edge along the *Approved* area in the northern section of this area should be upgraded to *Approved* classification. This change is due to upgrades that have been performed on a number of wastewater treatment plants which have discharge points along the shoreline. Included among these wastewater treatment plants are Neptune Township Sewerage Authority and South Monmouth Regional Sewerage Authority, along with several others which are located further north. The strip of water which is proposed to be upgraded to *Approved* extends north into the adjacent shellfish growing area. The portions of this area and the wastewater treatment plants which are in the adjacent shellfish growing area are addressed in a separate report relating specifically to that area. The primary upgrades performed at all the waste water treatment plants relate to providing for 24 hour staffing of the plants and alarms on the chlorination systems.

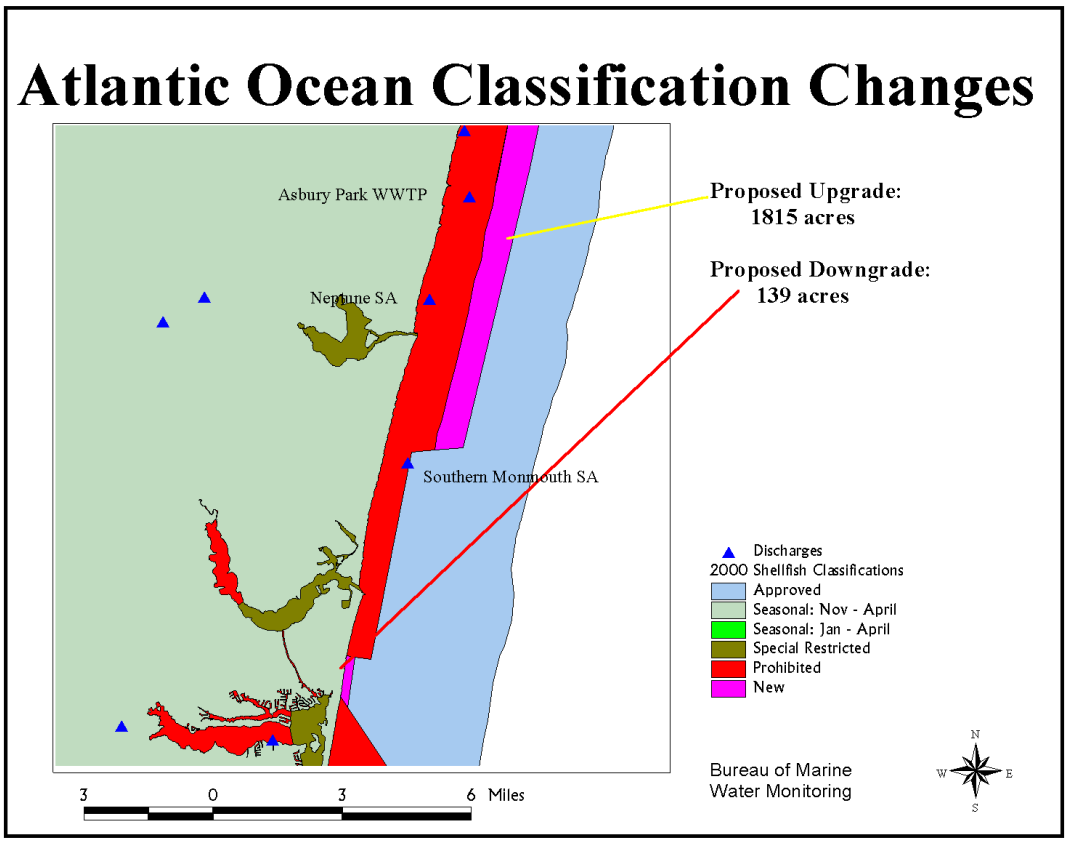


FIGURE 30: RECOMMENDED CHANGES IN CLASSIFICATION FOR SHELLFISH GROWING AREA

Legal Description for Recommended Changes:

The following changes to the legal description for this area, N.J.A.C. 7:12-2.1a(20)i – Atlantic Ocean need to be made. This description includes the entire 3629 acres to be upgraded.

N.J.A.C. 7:12-2.1a(20)i

20. Atlantic Ocean:

i. All of the ocean waters east of a line connecting the northernmost point of Sandy Hook and the southwesternmost point of Rockaway Point and south of the New York State line and extending to and following the New Jersey three nautical mile jurisdiction limit in a southerly direction until it intersects a line bearing approximately 269 degrees T connecting a point with coordinates of latitude 40 degrees 20.8 minutes N., longitude 73 degrees 47.7 minutes W. (generally marked by a buoy charted as W Or "BA" Gp Fl(4) 20 sec WHISTLE marking the separation zone on the Ambrose-Barnegat traffic lane) and the radio tower located at the New Jersey Marine Police Station, 128 Ocean Avenue, Borough of Monmouth Beach, with coordinates of latitude 40 degrees 20.5 minutes N., longitude 73 degrees 58.5 minutes W., then along that line to a point 1.5 nautical miles directly offshore, then along the shoreline in a southerly direction 1.5 nautical miles offshore to a point with coordinates of Latitude 40 degrees 16 minutes 34.36 seconds N., Longitude 73 degrees 56 minutes 56.45 seconds W., then bearing approximately 270 degrees T toward the the spire located at the northwest corner of Lake Drive and Ocean Avenue, City of Long Branch, with coordinates of Latitude 40 degrees 16 minutes 39.71 seconds N., Longitude 73 degrees 59 minutes 10.21 seconds W, to a point approximately 1.0 nautical miles offshore with the coordinates of Latitude 40 degrees 16 minutes 36.38 seconds N., longitude 73 degrees 57 minutes 44.97 seconds W., then proceeding in a southerly direction 1.0 nautical miles offshore from that point of intersection approximately 7.95 nautical miles to a point with coordinates of Latitude 40 degrees 8 minutes 54.89 seconds N., Longitude 74 degrees 0 minutesW., until it intersects a line beginning at the water tank located on 509 Monmouth Avenue, Borough of Spring Lake, with coordinates of latitude 40 degrees 08.8 minutes N., longitude 74 degrees 02.2 minutes W., and bearing approximately 085 degrees T through the dome of the Essex-Sussex Hotel, 700 Ocean Avenue, Borough of Spring Lake, with coordinates of latitude 40 degrees 08.8 minutes N., longitude 74 degrees 01.5 minutes W., then proceeding from that point of intersection in a westerly direction along that line towards the above noted dome until it is 0.5 nautical miles directly offshore, then continuing in a southerly direction 0.5 nautical miles offshore for approximately 3.9 nautical miles to a point with coordinates of latitude 40 degrees 5.1 minutes N., longitude 74 degrees 1.7 minutes W, then bearing approximately 280 degrees T (reciprocal 100 degrees T) [to the water tank located next to the junction of New York Avenue and the Con Rail Railroad tracks, Borough of Point Pleasant Beach, with coordinates of latitude 40 degrees 05.2 minutes N., longitude 74 degrees,2.8 minutes W., and terminating.] toward the water tank located next to the junction of New York Avenue and the Con Rail Railroad tracks, Borough of Point Pleasant Beach, with coordinates of latitude 40 degrees 05.2 minutes N., longitude 74 degrees,2.8 minutes W., to a point with coordinates of latitude 40 degrees 4 minutes 44.87 seconds N, longitude 74 degrees 2 minutes 8.72 seconds W, then in a southerly direction approximately 1000 feet offshore to a point with the coordinates of latitude 40 degrees 3 minutes 45.03 seconds N, longitude 74 degrees 2 minutes 20.97 seconds W. and terminating.

This closure adjoins those Prohibited waters in (a)3v above and in (a)20ii below, and those Special Restricted waters defined in N.J.A.C. 7:12-3.2;

Recommended Changes in Monitoring Schedule

There are several changes to the monitoring schedule which are being recommended. First, sampling stations A19A, A20A, A21A and A22A, which have been inactive, should be sampled on a regular basis to obtain surface water samples. Second, sampling stations A20B and A22B, which have also been inactive, should be sampled on a regular basis to obtain ocean bottom and surface water samples. Last, sampling station A22C should be eliminated from the sampling schedule.

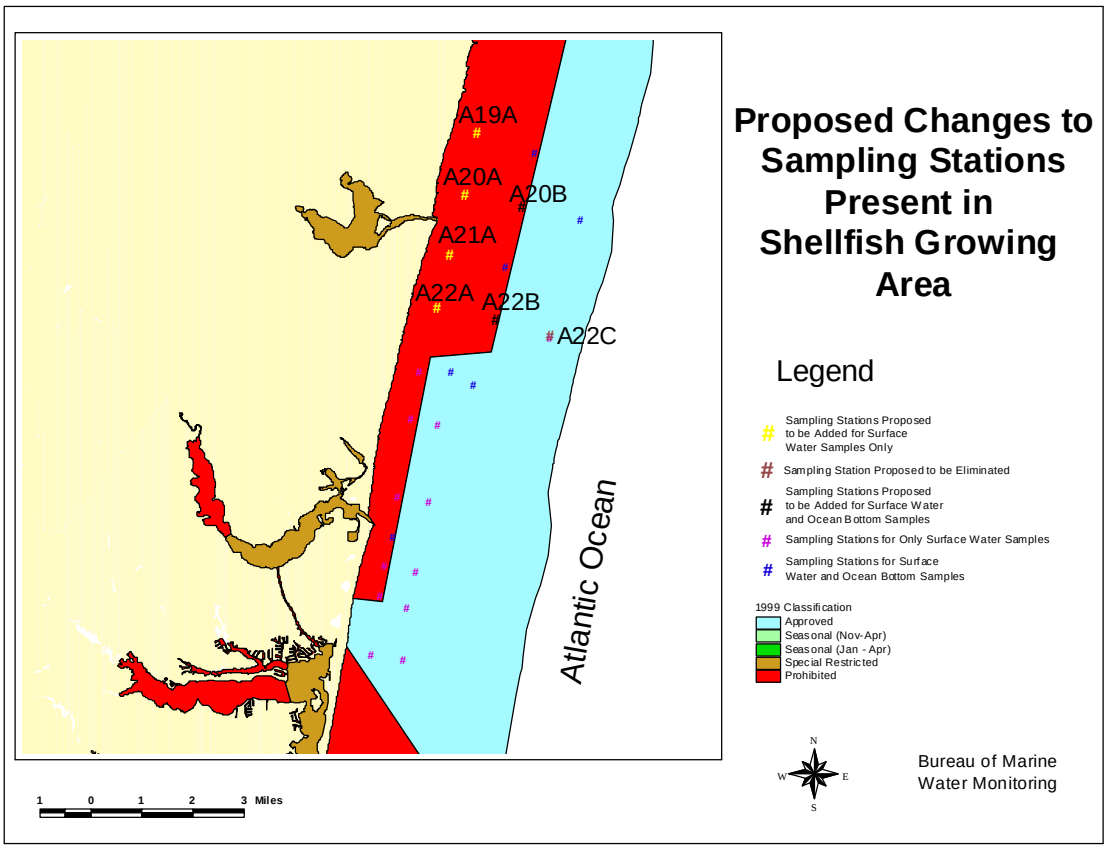


FIGURE 31: CHANGES PROPOSED FOR SAMPLING STATIONS IN SHELLFISH GROWING AREA

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APPENDICES

APPENDIX I

CAFRA Permit for Sea View Avenue Pump Station and Outfall

APPENDIX II

Results of Analysis of Samples Taken for Analysis

In Shellfish Growing Area –

Ocean Grove to Mantoloking